Co-doping a promising strategy for tuning functional properties of thin films for electronic applications

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If doping of Si with one type of dopant had a huge impact on optoelectronics from diverse aspects [16], co-doping could be considered as a significant technology because enhances the carrier mobility, modifies the recombination rate, and improves the light absorption and emission properties of Si-based devices. Junction-less transistors became possible with the advent of silicon-on-insulator (SOI) technology and require high doping to ensure a high current drive and to minimize contact resistance.

To explore the effects of co-doping on nanoscale devices (obtained by using silico -on-insulator technology) doped and co-doped channels were prepared. The influence of dopants on the structure and composition of device channel and the dependence of the current–voltage behaviour and the zero-bias anomaly on the channel diameter and temperature were investigated.

Transparent conducting oxides (TCOs) exhibit both high electrical conductivity and optical transparency in the visible range, which makes them useful in many applications. By co-doping electrical/optical or magnetic/optical properties can be tuned and there is a potential for engineering transparent conducting oxides for a wide range of applications.

Co-doped thin films in the system $In_{2-(x+y)}Sn_xZn_yO_3$ and system $In_{2-(x+y)}Sn_xMn_yO_3$ were deposited on different substrates (glass, quartz, Si) by thermal evaporation or spin coating and were structurally, electrically, optically and magnetically analysed.